EXHIBIT 3

Google supports and operates a messaging and communication platform (the "Google Fi Calling System") including an Internet Protocol (IP) Multimedia Subsystem (IMS). Before, 3G services were delivered using a circuit switched network. IMS is a system for delivering communication services over an IP network, such as a private network or the Internet. IMS performs routing, authentication, authorization, and accounting over the IP network. Several protocols are available for performing individual tasks, which are performed on the server level (or the base station level in telephony terms) provided by the network operator, in this case T-Mobile or Sprint. One such task is VoWiFi calling (also known as Voice over WiFi or VoWiFi), which is compliant with 3GPP standards and enabled by the IMS. Google Fi uses VoWiFi to 'fill the gaps' in Voice over LTE (VoLTE). See https://www.t-mobile.com/support/coverage/wi-fi-calling-from-t-mobile.

VoWiFi is an extension of the 3rd Generation Partnership Project's (3GPP) evolved packet core (EPC) architecture. The Google Fi Calling System implements VoWiFi, which allows any WiFi network to access the EPC provided by the Google Fi Calling System via an evolved packet data gateway (ePDG) at the border between the public Internet and a mobile core of the Google Fi Calling System. The ePDG creates a secure IPsec tunnel from the EPC all the way to the device and anchors traffic in the packet gateway (PGW) to the mobile core, which means a WiFi connection can be treated in the same way as a cellular connection by the mobile core.

Chart A applies claim 20 of the '234 Patent to the Google Fi Calling System. The Google Fi Calling System produces an access code identifying a communication channel useable by the mobile telephone to initiate a call to a callee using the channel. In the Google Fi Calling System, the access code is based on a location identifier and/or based on a location pre-associated with the mobile telephone. **Chart A** uses one theory of infringement as an example to demonstrate how elements of claim 20 read on the use of a domain name system (DNS) associated with the Google Fi Calling System, literally and/or using the doctrine of equivalents, to enable mobile telephone roaming. The DNS based theory set forth in **Chart A** is one example made without limitation to one or more additionally theories of infringement that, when described using at least some of the components and/or processes associated with the

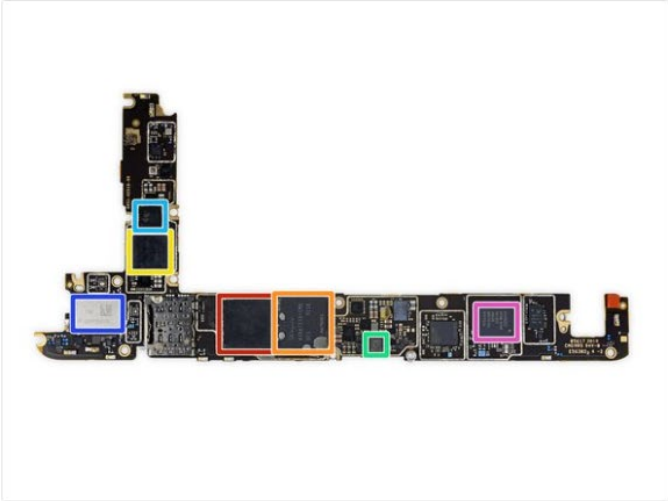
Google Fi Calling System already identified in **Chart A**, further demonstrate how elements of claim 20 read, literally and/or using the doctrine of equivalents, on the Google Fi Calling System.

CHART A

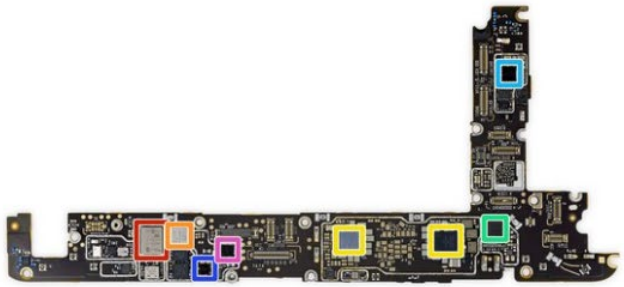
Patent 8,630,234	
20. [20p] A mobile telephone apparatus comprising:	The Google Fi Calling System includes a mobile telephone apparatus. In the Google Fi Calling System, for example, roaming with a mobile telephone (e.g., a caller's mobile telephone using VoWiFi calling) is performed when the caller's mobile telephone starts a VoWiFi call using the hardware, firmware, and/or VoWiFi software application compatible with the Google Fi Calling System. One example of the caller's mobile telephone is the Google Pixel 4 XL smartphone. The caller's mobile telephone uses the hardware, firmware, and/or VoWiFi software application compatible with the Google Fi Calling System to establish communication with the Google Fi server infrastructure and make a VoWiFi call to a callee's mobile telephone. The Google Fi server infrastructure includes one or more servers, such as: • One or more Google Fi domain name system (DNS) servers associated with the Google Fi server infrastructure that provide a naming system for computers, services, or other resources associated with the Google Fi server infrastructure. The Google Fi DNS servers associate domain names used by the hardware, firmware, and/or VoWiFi software application compatible with the Google Fi Calling System with various information (such as IP addresses) that facilitate communication with the computers, services, or other resources associated with the Google Fi server infrastructure.

	• One or more Google Fi Calling servers associated with the Google Fi server infrastructure that provide users the capability to exchange messages (including chats, group chats, images, videos, voice messages and files) and make Google Fi calls (voice and video) around the world. The Google Fi Calling servers include evolved packet core (EPC) servers in the Google Fi server infrastructure that provide converged voice and data on a 4G Long-Term Evolution (LTE) network. Components of the Google Fi EPC include:
	  ○ Mobility Management Entity (MME), which manages session states and authenticates and tracks a user across the Google Fi Calling System.
	  ○ Packet Data Node Gateway (PGW), which acts as the interface between the Google Fi LTE network and other Google Fi packet data networks.
	  ○ Evolved packet data gateway (ePDG), which provides a secure IPsec tunnel from the EPC to the caller's mobile telephone and anchors traffic in the packet gateway (PGW).
	• Google Fi Calling System is a mobile virtual network operator (MVNO) telecommunications service by Google that provides telephone calls, SMS, and mobile broadband using cellular networks and Wi-Fi. Google Fi uses networks operated by T-Mobile and U.S. Cellular.

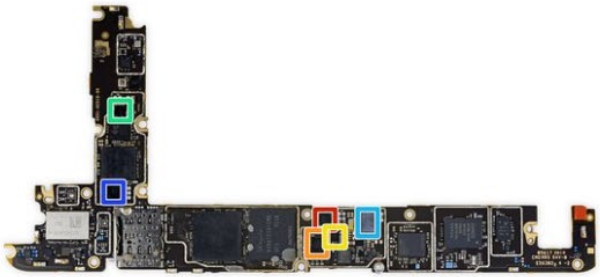
[20a] a processor circuit;	The Google Fi Calling System includes a processor circuit.

	In the Google Fi Calling System, for example, the callee's mobile telephone includes a processor circuit. For example, as part of the processor circuit, the Google Pixel 4 XL ("Google Pixel") includes a Snapdragon 855 SM8150 processor.   ● We have to dispose of quite a few brackets and shields on our way to the motherboard, but it's all worth it for these chips: ● 6 GB of Micron LPDDR4X RAM layered over the Qualcomm Snapdragon 855 ● SK hynix H28U72301CMR 64 GB Universal Flash Storage ● Samsung K4U4E3S4AF-HGCJ mystery RAM, with a big "P" on it—best guess, this is dedicated RAM for the new Pixel Neural Core chip, likely hiding directly underneath ● Pixel H1C2M3 Titan M security chip ● Knowles 8508A quad-core audio processor, no doubt to help with the new live caption and transcription features. ● Murata SS9709025 ● Avago AFEM-9106 (likely a front-end module) See https://www.ifixit.com/Teardown/Google+Pixel+4+XL+Teardown/127320.

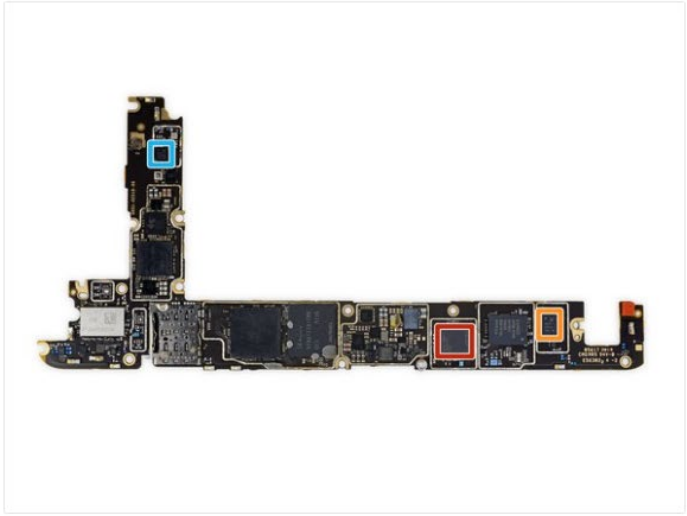
[20b] a network interface in communication with said processor circuit; and	The Google Fi Calling System includes a network interface in communication with said processor circuit. In the Google Fi Calling System, for example, the caller's mobile telephone includes a network interface in communication with the processor circuit. For example, the callee's mobile telephone includes the following network interfaces: FDD-LTE (Bands 1, 2, 3, 4, 5, 7, 8, 12, 13, 14, 17, 18, 19, 20, 25, 26, 29, 30, 66, 71) TD-LTE (Bands 34, 38, 39, 40, 41, 42, 46, 48) CDMA EV-DO Rev. A (800, 1900 MHz) UMTS/HSPA+/DC-HSDPA (850, 900, 1700/2100, 1900, 2100 MHz) GSM/EDGE (850, 900, 1800, 1900 MHz) Gigabit-class LTE with 2x2 MIMO and LAA4 802.11 Wi-Fi Bluetooth wireless technology The network interface includes a Qualcomm SDR8150 RF transceiver and Skyworks Skyworks Sky5-8212-11 and Skyworks SKY78215-11 front end modules developed for 4G/3G LTE/WCDMA/ HSDPA/HSUPA applications. The network interface further includes the Murata SS9709025 BT/WLAN module, which contains a Qualcomm Atheros CLD WLAN module.

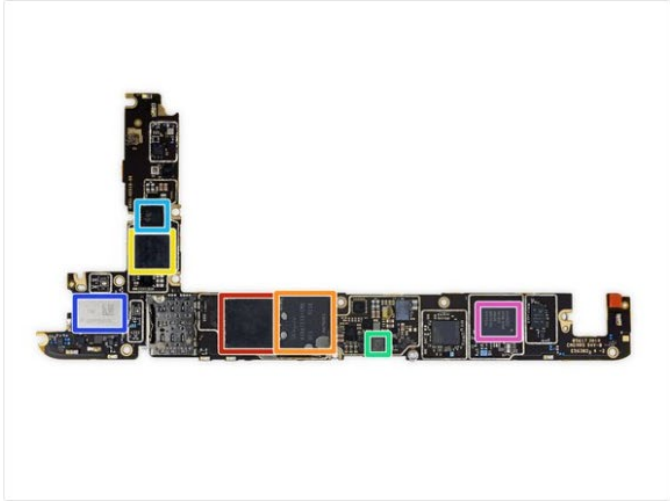


- Side B of this record features:
  - Skyworks Sky5-8212-11 front-end module
  - Qualcomm QET5100 envelope tracker
  - Qualcomm PM8150 and PM8150A PMICs
  - STMicroelectronics ST54J NFC controller
  - Maxim MAX77826 companion PMIC
  - XSPT6 SMC85201 Z
  - Cirrus Logic CS35L36CWZ audio amplifier



- Chip ID, director's cut part 1:
  - Maxim Integrated MAX11261 6-ch. 24 bit delta-sigma ADC
  - Renesas (Formerly IDT) P9221-R 15 W wireless power receiver
  - Cirrus Logic CS40L25 haptic driver
  - Cirrus Logic CS35L36CWZ audio amplifier
  - Qualcomm PM8150S power management IC
  - Samsung S2MPG01 wireless charging chip (likely)
  - Dialog Semiconductor mixed signal array

	   ● Chip ID, director's cut part 2: ● Qualcomm SDR8150 RF transceiver ● Skyworks SKY78215-11 front end module ● Skyworks SKY77365-11 quad-band GSM/GPRS/EDGE power amplifier module ● Skyworks SKY13726-11 LMB/MB/HB/UHB diversity receive module ● Skyworks SKY13727-11 MB/HB/UHB MIMO diversity receive module ● Skyworks SKY53735-11 LB/LMB/MB/HB diversity receive module See https://www.ifixit.com/Teardown/Google+Pixel+4+XL+Teardown/127320.
[20c] a computer readable medium in communication with said processor circuit and encoded with codes for directing said processor circuit to:	The Google Fi Calling System includes a computer readable medium in communication with said processor circuit and encoded with codes for directing said processor circuit. In the Google Fi Calling System, for example, the caller's mobile telephone includes a computer readable medium in communication with the processor circuit and encoded with codes for directing the processor circuit. For example, the caller's mobile telephone includes random access memory (RAM) and storage memory to hold operating system (OS) and application data.

	The computer readable medium includes 6 GB of Micron or Samsung K4U4E3S4AF-HGCJ LPDDR4X RAM. The computer readable medium also includes the SK hynix H28U72301CMR 64 GB Universal Flash Storage.   ● We have to dispose of quite a few brackets and shields on our way to the motherboard, but it's all worth it for these chips: ● 6 GB of Micron LPDDR4X RAM layered over the Qualcomm Snapdragon 855 ● SK hynix H28U72301CMR 64 GB Universal Flash Storage ● Samsung K4U4E3S4AF-HGCJ mystery RAM, with a big "P" on it—best guess, this is dedicated RAM for the new Pixel Neural Core chip, likely hiding directly underneath ● Pixel H1C2M3 Titan M security chip ● Knowles 8508A quad-core audio processor, no doubt to help with the new live caption and transcription features. ● Murata SS9709025 ● Avago AFEM-9106 (likely a front-end module) See https://www.ifixit.com/Teardown/Google+Pixel+4+XL+Teardown/127320.

[20d] receive, from a user of the mobile telephone, a callee identifier associated with the callee;	The Google Fi Calling System receives, from a user of the mobile telephone, a callee identifier associated with the callee. In the Google Fi Calling System, for example, the caller's mobile telephone uses the hardware, firmware, and/or VoWiFi software application compatible with the Google Fi Calling System to exchange messages and make Google Fi calls. Composing a message or initiating a VoWiFi call using message the hardware, firmware, and/or VoWiFi software application compatible with the Google Fi Calling System begins with a user entering of a callee identifier associated with a callee into the caller's mobile telephone. The user input, which may comprise a partial name, a partial email address, or a partial telephone number, is input into the contact list search box, on a touch screen displaying contacts to obtain the callee identifier, and/or via voice command and which comprises one or more email addresses and/or telephone numbers associated with the callee. The caller's mobile telephone uses the hardware, firmware, and/or VoWiFi software application compatible with the Google Fi Calling System to obtain the email addresses and/or telephone numbers associated with the callee from the user input associated with the caller's mobile telephone.
[20e-1] cause an access code request message to be transmitted to an access server	The Google Fi Calling System transmits an access code request message to an access server to seek an access code from a pool of access codes.

	In the Google Fi Calling System, for example, receiving the email addresses and/or the telephone numbers associated with the callee causes the caller's mobile telephone to use the hardware, firmware, and/or VoWiFi software application compatible with the Google Fi Calling System to transmit an access code request message to an access server. In the Google Fi Calling System, for example, the caller's mobile telephone uses the hardware, firmware, and/or VoWiFi software application compatible with the Google Fi Calling System to transmit an access code request message to an access server. In response to receiving the email addresses and/or the telephone numbers associated with the callee, the caller's mobile telephone uses the hardware, firmware, and/or VoWiFi software application compatible with the Google Fi Calling System to transmit an access code request message comprising one or more parts or portions. The caller's mobile telephone communicates the parts or portions associated with the access code request message to an access server comprising one or more servers associated with the Google Fi server infrastructure. • In one or more communications, the caller's mobile telephone uses the hardware, firmware, and/or VoWiFi software application compatible with the Google Fi Calling System to communicate one or more packets with one or more access servers, such as one or more of the Google Fi DNS servers associated with the Google Fi server infrastructure. The packets communicated with the Google Fi DNS servers comprise one or more of the parts or portions associated with the access code request message. The packets, for example, comprise information

	asking the Google Fi DNS servers to identify one or more access servers to use to exchange a message or setup and initiate a VoWiFi call. Specifically, the packets comprise one or more DNS queries that query the Google Fi DNS servers for one or more IP addresses associated with one or more of the Google Fi Calling servers. The caller's mobile telephone uses the hardware, firmware, and/or VoWiFi software application compatible with the Google Fi Calling System to communicate at least one DNS query asking the Google Fi DNS servers for the IP addresses associated with the Google Fi Calling servers. One or more domain names are used by the hardware, firmware, and/or VoWiFi software application compatible with the Google Fi Calling System to communicate with the Google Fi DNS servers to obtain the IP addresses associated with the Google Fi Calling servers. • In one or more communications, the caller's mobile telephone uses the hardware, firmware, and/or VoWiFi software application compatible with the Google Fi Calling System to communicate one or more packets with one or more access servers, such as one or more of the Google Fi Calling servers associated with the Google Fi server infrastructure. The packets communicated with the Google Fi Calling servers comprise one or more of the parts or portions forming the access code request message. The packets, for example, comprise information asking the Google Fi Calling servers how to select a calling gateway, exchange a message, or setup and initiate a VoWiFi call with one or more access servers. Specifically, the packets comprise information asking the Google Fi Calling servers to select and

	connect to a calling gateway and establish an IPsec and SIP connection, through which voice/video calls are made to the callee's mobile telephone using the RTP protocol through the ePDG and routed by the PGW. See https://www.t-mobile.com/support/coverage/wi-fi-calling-on-a-corporate-network, for example when Google Fi operates using T-Mobile as the underlying carrier. The caller's mobile telephone uses the hardware, firmware, and/or VoWiFi software application compatible with the Google Fi Calling System to communicate with Google Fi Calling servers associated with the IP addresses identified by the Google Fi DNS servers, to select and connect to a calling gateway and establish an IPsec and SIP connection, through which voice/video calls are made to the callee's mobile telephone using the RTP protocol through the ePDG and routed by the PGW.
[20e-2] to seek an access code from a pool of access codes wherein each access code in said pool of access codes identifies a respective telephone number or Internet Protocol (IP) network address that enables a local call to be made to call the callee identified by the callee identifier	The Google Fi Calling System transmits an access code request message to seek an access code from a pool of access codes and includes a pool of access codes wherein each access code in said pool of access codes identifies a respective telephone number or Internet Protocol (IP) network address that enables a local call to be made to call the callee identified by the callee identifier. In the Google Fi Calling System, for example, the caller's mobile telephone uses the hardware, firmware, and/or VoWiFi software application compatible with the Google Fi Calling System to transmit an access code request message comprising one or more parts or portions. The caller's mobile telephone communicates the parts or portions associated with the access code request message with the Google Fi server infrastructure, including

	the email address or telephone number associated with the caller discussed with respect element [20d]. The email address or telephone number identified in element [20d] is an example of the callee identifier. • In one or more communications, the caller's mobile telephone uses the hardware, firmware, and/or VoWiFi software application compatible with the Google Fi Calling System to communicate an email address or telephone number with the Google Fi Calling servers. Specifically, the caller's mobile telephone uses the hardware, firmware, and/or VoWiFi software application compatible with the Google Fi Calling System to communicate an email address or telephone number with the Google Fi Calling servers to select and connect to a calling gateway and establish an IPsec and SIP connection, through which voice/video calls are made to the callee's mobile telephone using the RTP protocol through the ePDG and routed by the PGW.
[20e-3] said access code request message including said callee identifier and	The Google Fi Calling System includes the callee identifier in the access code request message. In the Google Fi Calling System, for example, the caller's mobile telephone uses the hardware, firmware, and/or VoWiFi software application compatible with the Google Fi Calling System to transmit an access code request message comprising one or more parts or portions. The caller's mobile telephone communicates the parts or portions associated with the access code request message with the Google Fi server infrastructure, including

	the email address or telephone number associated with the caller discussed with respect element [1a]. The email address or telephone number identified in element [1a] is an example of the callee identifier. • In one or more communications, the caller's mobile telephone uses the hardware, firmware, and/or VoWiFi software application compatible with the Google Fi Calling System to communicate an email address or telephone number with the Google Fi Calling servers. Specifically, the caller's mobile telephone uses the hardware, firmware, and/or VoWiFi software application compatible with the Google Fi Calling System to communicate an email address or telephone number with the Google Fi Calling servers to select and connect to a calling gateway and establish an IPsec and SIP connection, through which voice/video calls are made to the callee's mobile telephone using the RTP protocol through the ePDG and routed by the PGW.
[20e-4] a location identifier separate and distinctive from said callee identifier	The Google Fi Calling System includes a location identifier separate and distinctive from the callee identifier in the access code request message. In the Google Fi Calling System, for example, the caller's mobile telephone uses the hardware, firmware, and/or VoWiFi software application compatible with the Google Fi Calling System to transmit an access code request message comprising one or more parts or portions. The caller's mobile telephone communicates the parts or portions associated with the access code request message with the Google Fi server infrastructure, including

	an IP address associated with the caller's mobile telephone. The IP address associated with the caller's mobile telephone is an example of the location identifier and is separate and distinctive from the callee identifier as set forth in element [20e-3]. • In one or more communications, the caller's mobile telephone uses the hardware, firmware, and/or VoWiFi software application compatible with the Google Fi Calling System to communicate an IP address associated with the caller's mobile telephone with the Google Fi DNS servers to obtain one or more IP addresses associated with one or more Google Fi Calling servers. • In one or one or more communications, the caller's mobile telephone uses the hardware, firmware, and/or VoWiFi software application compatible with the Google Fi Calling System to communicate an IP address associated with the caller's mobile telephone with the Google Fi Calling servers for the information asking the Google Fi Calling servers how to exchange a message or setup and initiate a VoWiFi call.
[20e-5] said location identifier identifying a location of the mobile telephone;	The Google Fi Calling System includes a location identifier identifying a location of the mobile telephone in the access code request message. In the Google Fi Calling System, for example, the caller's mobile telephone uses the hardware, firmware, and/or VoWiFi software application compatible with the Google Fi Calling System to transmit an access code request message comprising one or more parts or portions. The caller's mobile telephone communicates the parts or portions associated

	with the access code request message with the one or more communications, including an IP address associated with the caller's mobile telephone. The IP address associated with the caller's mobile telephone identifies a location associated with the caller's mobile telephone, such as one or more of the following locations: • an actual geographic location associated with the caller's mobile telephone, which is identified by an IP address assigned to the caller's mobile telephone by a service provider, such as a wireless carrier or Internet Service Provider (ISP); • an actual geographic location associated with the caller's mobile telephone, which is identified by an IP address assigned to a router by a service provider, such as a wireless carrier or ISP, and through which the caller's mobile telephone directly or indirectly communicates with the Google Fi server infrastructure; • an actual geographic location associated with the caller's mobile telephone, which is identified by an IP address assigned to a proxy server by a service provider independent of the Google Fi server infrastructure, such as a wireless carrier or ISP, and which is physically located at an office/data center owned or leased by the service provider or a customer of the service provider and through which the caller's mobile telephone directly or indirectly communicates with the Google Fi server infrastructure; • a relative geographic location associated with the caller's mobile telephone, which is identified using a location physically or logically relative to the Google Fi server infrastructure by an IP address assigned by a service provider independent of the Google Fi server infrastructure to the caller's mobile telephone, a router through

	which the caller's mobile telephone communicates with the Google Fi server infrastructure, or a proxy server through which the caller's mobile telephone communicates with the Google Fi server infrastructure; • a proximate location associated with the caller's mobile telephone, which is identified using a location physically or logically approximate to the Google Fi server infrastructure by an IP address assigned by a service provider independent of the Google Fi server infrastructure to the caller's mobile telephone, a router through which the caller's mobile telephone communicates with the Google Fi server infrastructure, or a proxy server through which the caller's mobile telephone communicates with the Google Fi server infrastructure.
[20f-1] receive an access code reply message from the access server in response to said access code request message,	The Google Fi Calling System receives an access code reply message from the access server in response to said access code request message. In the Google Fi Calling System, for example, the caller's mobile telephone uses the hardware, firmware, and/or VoWiFi software application compatible with the Google Fi Calling System to receive an access code reply message from the access server in response to the access code request message. The caller's mobile telephone uses the hardware, firmware, and/or VoWiFi software application compatible with the Google Fi Calling System to receive the access code reply message comprising one or more parts or portions. The caller's mobile telephone obtains the parts or portions associated with the access code

	reply message from an access server comprising one or more servers associated with the Google Fi server infrastructure. • In one or more communications, the caller's mobile telephone uses the hardware, firmware, and/or VoWiFi software application compatible with the Google Fi Calling System to obtain one or more packets from one or more access servers, such as one or more of the Google Fi DNS servers associated with the Google Fi server infrastructure. The packets communicated from the Google Fi DNS servers comprise one or more parts or portions associated with the access code reply message. The packets, for example, comprise information identifying one or more access servers to use to exchange a message or setup and initiate a VoWiFi call. Specifically, the packets comprise one or more DNS replies that answer at least one query from the caller's mobile telephone for one or more IP addresses associated with one or more of the Google Fi Calling servers. The packets include at least one DNS reply communicated from the Google Fi DNS servers. • In one or more communications, the caller's mobile telephone uses the hardware, firmware, and/or VoWiFi software application compatible with the Google Fi Calling System to obtain one or more packets from one or more access servers, such as one or more of the Google Fi Calling servers associated with the Google Fi server infrastructure. The packets communicated from the Google Fi Calling servers comprise one or more parts or portions associated with the access code reply message. The packets, for example, comprise information from the Google Fi Calling servers on how to select a calling gateway, exchange a message, or setup

	and initiate a VoWiFi call with one or more access servers. Specifically, the packets comprise information asking the Google Fi Calling servers to select and connect to a calling gateway and establish an IPsec and SIP connection, through which voice/video calls are made to the callee's mobile telephone using the RTP protocol through the ePDG and routed by the PGW. The caller's mobile telephone uses the hardware, firmware, and/or VoWiFi software application compatible with the Google Fi Calling System to obtain, from the Google Fi Calling servers associated with the IP addresses identified by the Google Fi DNS servers, the information on how to select and connect to a calling gateway and establish an IPsec and SIP connection, through which voice/video calls are made to the callee's mobile telephone using the RTP protocol through the ePDG and routed by the PGW.
[20f-2] said access code reply message including an access code different from said callee identifier and	The Google Fi Calling System receives said access code reply message including an access code different from said callee identifier. In the Google Fi Calling System, for example, the caller's mobile telephone uses the hardware, firmware, and/or VoWiFi software application compatible with the Google Fi Calling System to receive the access code reply message comprising one or more parts or portions. The caller's mobile telephone communicates with the Google Fi server infrastructure to obtain the parts or portions associated with the access code request

	message, including an access code different from the callee identifier as set forth in element [20e-3]. In the Google Fi Calling System, for example: • In one or more communications with the Google Fi DNS servers, the caller's mobile telephone obtains all or part of the access code, comprising the IP addresses associated with the Google Fi Calling servers. The Google Fi DNS servers resolve the DNS queries for IP addresses associated with the Google Fi server infrastructure. The access code comprising the IP addresses associated with the Google Fi server infrastructure is different from the callee identifier as set forth in element [20e-3]. • In one or more communications with the Google Fi Calling servers, the caller's mobile telephone obtains all or part of the access code, comprising the information from the Google Fi Calling servers on how to exchange a message or setup and initiate a VoWiFi call. The access code comprising the information from the Google Fi Calling servers on how to exchange a message or setup and initiate a VoWiFi call is different from the callee identifier as set forth in element [20e-3].
[20f-3] associated with said location identifier and/or associated with a location pre-associated with the mobile telephone	The Google Fi Calling System receives said access code reply message including an access code associated with said location identifier and/or associated with a location pre-associated with the mobile telephone.

	In the Google Fi Calling System, for example, the caller's mobile telephone uses the hardware, firmware, and/or VoWiFi software application compatible with the Google Fi Calling System to receive the access code reply message comprising one or more parts or portions. The caller's mobile telephone communicates with the Google Fi server infrastructure to obtain the parts or portions associated with the access code request message, including an access code associated with the location identifier and/or associated with a location pre-associated with the caller's mobile telephone. In the Google Fi Calling System, for example: • In one or more communications with the Google Fi DNS servers, the caller's mobile telephone obtains all or part of the access code, comprising the IP addresses associated with the Google Fi Calling servers. The access code, comprising the IP addresses associated with the Google Fi Calling servers, is associated with the location identifier and/or associated with a location pre-associated with the mobile telephone. The caller's mobile telephone communicates with the Google Fi DNS servers using an IP address associated with the caller's mobile telephone, which comprises the location identifier as discussed with respect to element [1b-5]. The Google Fi DNS servers use the IP address associated with the caller's mobile telephone to resolve the DNS queries for IP addresses associated with the Google Fi server infrastructure. For example, the Google Fi DNS servers resolve the DNS queries within the block of IP addresses assigned to T-Mobile when used as the underlying carrier. The Google Fi DNS servers use the IP address associated with

	the caller's mobile telephone as the location identifier to return IP addresses within the block assigned to T-Mobile for geographically situated servers associated with the Google Fi server infrastructure. • In one or more communications with the Google Fi Calling servers, the caller's mobile telephone obtains all or part of the access code, comprising the information from the Google Fi Calling servers on how to exchange a message or setup and initiate a VoWiFi call. The access code, comprising the information from the Google Fi Calling servers on how to exchange a message or setup and initiate a VoWiFi call, is associated with the location identifier and/or associated with a location pre-associated with the mobile telephone. The caller's mobile telephone uses the hardware, firmware, and/or VoWiFi software application compatible with the Google Fi Calling System to communicate with the Google Fi Calling servers using an IP address associated with the caller's mobile telephone, which comprises the location identifier as discussed with respect to element [1b-5]. The Google Fi Calling servers use the IP address associated with the caller's mobile telephone to establish the shared secret and derive the session keys for the media channels. The Google Fi Calling servers use the IP address associated with the caller's mobile telephone as the location identifier to select and connect to a calling gateway and establish an IPsec and SIP connection, through which voice/video calls are made to the callee's mobile telephone using the RTP protocol through the ePDG and routed by the PGW for geographically situated servers associated with the Google Fi server infrastructure.

[20f-4] wherein said access code expires after a period of time; and	The Google Fi Calling System receives said access code reply message including an access code, wherein said access code expires after a period of time. In the Google Fi Calling System, for example, the caller's mobile telephone uses the hardware, firmware, and/or VoWiFi software application compatible with the Google Fi Calling System to receive the access code reply message comprising one or more parts or portions. The caller's mobile telephone communicates with the Google Fi server infrastructure to obtain the parts or portions associated with the access code request message, including an access code that expires after a period of time. • In one or more communications, the caller's mobile telephone obtains all or part of the access code, comprising the IP addresses associated with the Google Fi Calling servers. The access code, comprising the IP addresses associated with the Google Fi Calling servers, expires after a period of time. The Google Fi DNS servers assign time-to-live TTL values in the DNS reply messages resolving the IP addresses for the Google Fi server infrastructure. The TTL values indicate that validity of the responses resolving the IP addresses expires after a period of time. • In one or more communications, the caller's mobile telephone obtains all or part of the access code, comprising the information from the Google Fi Calling servers on how to exchange a message or setup and initiate a VoWiFi call. The access code, comprising the information from the Google Fi Calling servers on how to exchange a message or setup and initiate a VoWiFi call, expires after a period of time. The information from the Google Fi Calling servers on how to exchange a message or

	setup and initiate a VoWiFi call includes select and connect to a calling gateway and establish an IPsec and SIP connection, through which voice/video calls are made to the callee's mobile telephone using the RTP protocol through the ePDG and routed by the PGW.
[20g] initiate a call using said access code to identify the callee.	The Google Fi Calling System initiates a call with the mobile telephone using the access code to identify the callee. In the Google Fi Calling System, for example, the caller's mobile telephone uses the hardware, firmware, and/or VoWiFi software application compatible with the Google Fi Calling System to initiate a call using the access code to identify the callee. • The caller's mobile telephone uses the hardware, firmware, and/or VoWiFi software application compatible with the Google Fi Calling System to initiate the T-Mobile call using the IP addresses obtained from the Google Fi DNS servers that identify the Google Fi Calling servers through which a call to the callee can be initiated. • The caller's mobile telephone uses the hardware, firmware, and/or VoWiFi software application compatible with the Google Fi Calling System to initiate the T-Mobile call using the information from the Google Fi Calling servers on how to exchange a message or setup and initiate a VoWiFi call. The caller's mobile telephone uses the hardware, firmware, and/or VoWiFi software application compatible with the Google Fi Calling System to select and connect to a calling

	gateway and establish an IPsec and SIP connection, through which voice/video calls are made to the callee's mobile telephone using the RTP protocol through the ePDG and routed by the PGW. The Google Fi Calling System enables mobile telephone roaming. The Google Fi Calling System produces an access code identifying a communication channel useable by the mobile telephone to initiate a call to a callee using the channel. In the Google Fi Calling System, the access code is based on a location identifier and/or based on a location pre-associated with the mobile telephone. The access code identifies a communication channel to which the caller's mobile telephone may initiate a VoWiFi call. In the Google Fi Calling System, communication channels provided by the Google Fi Calling servers are used for Google Fi calls between mobile telephones using VoWiFi. The communications channels also can connect the caller's mobile telephone with other devices using telephone lines in a Public Switched Telephone Network (PSTN). The Google Fi Calling servers can direct calls that are received on the communications channels to a gateway leading to the PSTN. The Google Fi Calling servers use the communications channels to cooperate with an IP network and the gateway to the PSTN to cause a call involving the caller's mobile telephone to be routed through the IP network and continue to the PSTN. The communication channels provided by the Google Fi Calling servers provide the benefit of a local calling area associated with the caller's mobile telephone, both over the IP network and the PSTN. The expression "local calling area" herein refers generally to where calls may be placed by callers within the local calling area at either no additional charge or at a

	lower additional charge than would be required for calls to numbers that are outside of the local calling area.

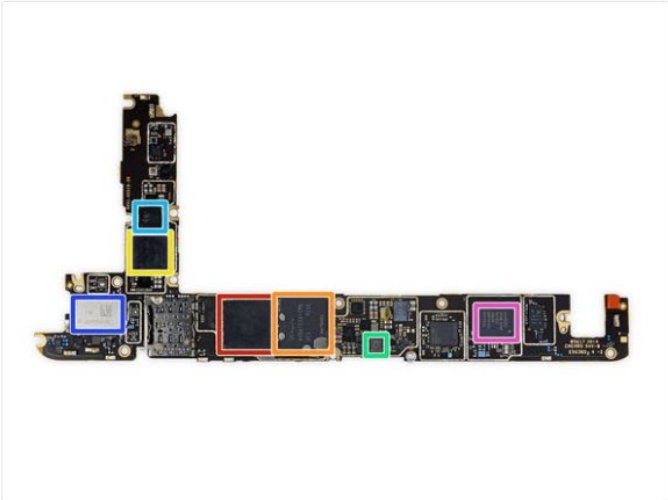
Google manufacturers, supports, and operates a messaging and communication platform (the "Google-Hangouts Calling System"). The Google-Hangouts Calling System includes Google Hangouts, or simply Hangouts, which is a cross-platform centralized messaging and voice-over-IP service owned by Google, Inc. Hangouts allows smartphone and desktop users to send text messages and voice messages, make voice and video calls, and share images, documents, user locations, and other content. See https://support.google.com/hangouts/answer/2944865?hl=en&ref_topic=6386410.

In the Google-Hangouts Calling System, users of the desktop computers, laptops, tablets, smartphones, and mobile devices can send messages including text, images, video and audio to others using the software applications running on such devices. Hangouts Calling is a voice calling service on most supported devices.

Chart B applies claim 20 of the '234 Patent to the Google-Hangouts Calling System. The Google-Hangouts Calling System produces an access code identifying a communication channel useable by the mobile telephone to initiate a call to a callee using the channel. In the Google-Hangouts Calling System, the access code is based on a location identifier and/or based on a location pre-associated with the mobile telephone. **Chart B** uses one theory of infringement as an example to demonstrate how elements of claim 20 read on the use of a domain name system (DNS) associated with the Google-Hangouts Calling System, literally and/or using the doctrine of equivalents, to enable mobile telephone roaming. The DNS based theory set forth in **Chart B** is one example made without limitation to one or more additionally theories of infringement that, when described using at least some of the components and/or processes associated with the Google-Hangouts Calling System already identified in **Chart B**, further demonstrate how elements of claim 20 read, literally and/or using the doctrine of equivalents, on the Google-Hangouts Calling System.

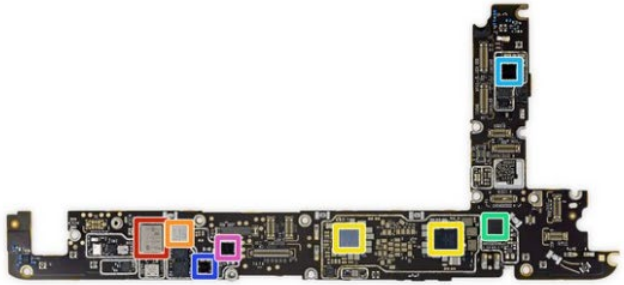
CHART B

Patent 8,630,234	
20. [20p] A mobile telephone apparatus comprising:	The Google-Hangouts Calling System includes a mobile telephone apparatus. In the Google-Hangouts Calling System, for example, roaming with a mobile telephone (e.g., a caller's mobile telephone) is performed when the caller's mobile telephone starts a Hangouts call using the Hangouts software application. One example of the caller's mobile telephone is the Google Pixel 4 XL smartphone. The caller's mobile telephone uses the Hangouts software application to establish communication with the Google-Hangouts server infrastructure and make a Hangouts call to a callee's mobile telephone. The Google-Hangouts server infrastructure includes one or more servers, such as: • One or more Hangouts domain name system (DNS) servers associated with the Google-Hangouts server infrastructure that provide a naming system for computers, services, or other resources associated with the Google-Hangouts server infrastructure. The Hangouts DNS servers associate domain names used by the Hangouts software application with various information (such as IP addresses) that facilitate communication with the computers, services, or other resources associated with the Google-Hangouts server infrastructure. • One or more Hangouts Calling servers associated with the Google-Hangouts server infrastructure that provide users the capability to exchange messages (including

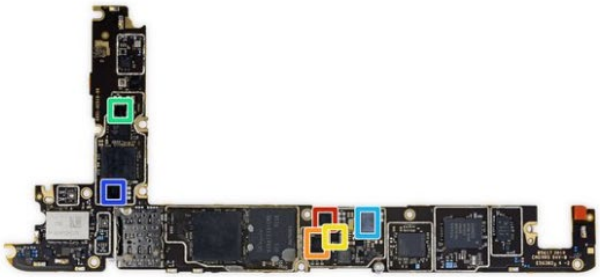
	chats, group chats, images, videos, voice messages and files) and make Hangouts calls (voice and video) around the world.
[20a] a processor circuit;	The Google-Hangouts Calling System includes a processor circuit. In the Google-Hangouts Calling System, for example, the callee's mobile telephone includes a processor circuit. For example, as part of the processor circuit, the Google Pixel 4 XL ("Google Pixel") includes a Snapdragon 855 SM8150 processor.   • We have to dispose of quite a few brackets and shields on our way to the motherboard, but it's all worth it for these chips: • 6 GB of Micron LPDDR4X RAM layered over the Qualcomm Snapdragon 855 • SK hynix H28U72301CMR 64 GB Universal Flash Storage • Samsung K4U4E3S4AF-HGCJ mystery RAM, with a big "P" on it—best guess, this is dedicated RAM for the new Pixel Neural Core chip, likely hiding directly underneath • Pixel H1C2M3 Titan M security chip • Knowles 8508A quad-core audio processor, no doubt to help with the new live caption and transcription features. • Murata SS9709025 • Avago AFEM-9106 (likely a front-end module)

	See https://www.ifixit.com/Teardown/Google+Pixel+4+XL+Teardown/127320.
[20b] a network interface in communication with said processor circuit; and	The Google-Hangouts Calling System includes a network interface in communication with said processor circuit. In the Google-Hangouts Calling System, for example, the caller's mobile telephone includes a network interface in communication with the processor circuit. For example, the callee's mobile telephone includes the following network interfaces: FDD-LTE (Bands 1, 2, 3, 4, 5, 7, 8, 12, 13, 14, 17, 18, 19, 20, 25, 26, 29, 30, 66, 71) TD-LTE (Bands 34, 38, 39, 40, 41, 42, 46, 48) CDMA EV-DO Rev. A (800, 1900 MHz) UMTS/HSPA+/DC-HSDPA (850, 900, 1700/2100, 1900, 2100 MHz) GSM/EDGE (850, 900, 1800, 1900 MHz) Gigabit-class LTE with 2x2 MIMO and LAA4 802.11 Wi-Fi Bluetooth wireless technology The network interface includes a Qualcomm SDR8150 RF transceiver and Skyworks Skyworks Sky5-8212-11 and Skyworks SKY78215-11 front end modules developed for 4G/3G LTE/WCDMA/ HSDPA/HSUPA applications.

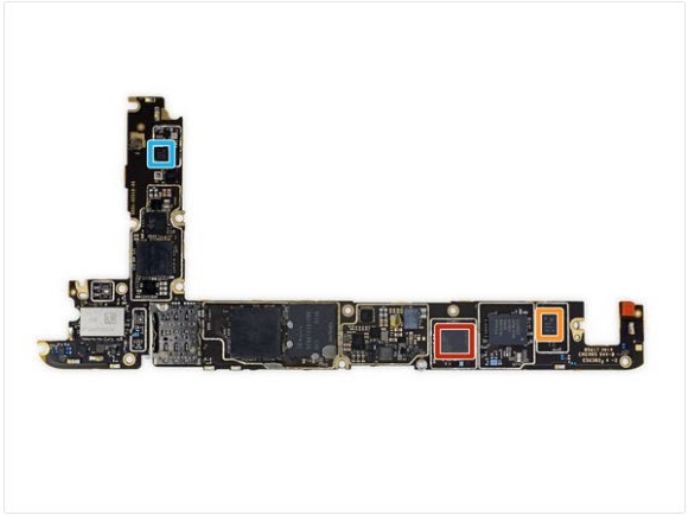
	The network interface further includes the Murata SS9709025 BT/WLAN module, which contains a Qualcomm Atheros CLD WLAN module.

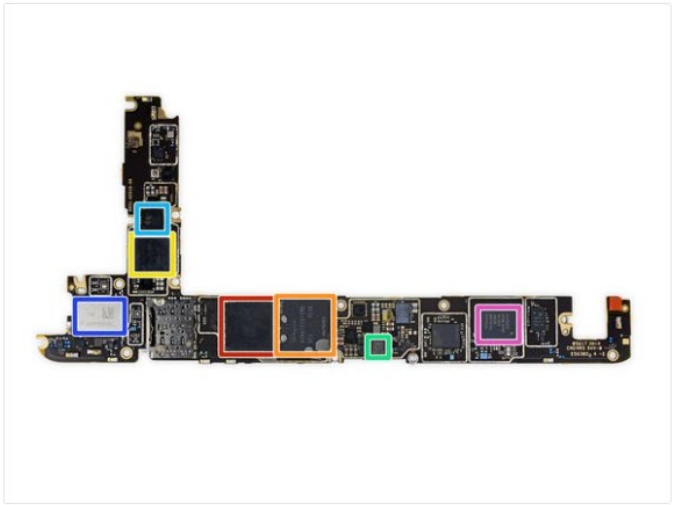


- Side B of this record features:
  - Skyworks Sky5-8212-11 front-end module
  - Qualcomm QET5100 envelope tracker
  - Qualcomm PM8150 and PM8150A PMICs
  - STMicroelectronics ST54J NFC controller
  - Maxim MAX77826 companion PMIC
  - XSPT6 SMC85201 Z
  - Cirrus Logic CS35L36CWZ audio amplifier



- Chip ID, director's cut part 1:
  - Maxim Integrated MAX11261 6-ch. 24 bit delta-sigma ADC
  - Renesas (Formerly IDT) P9221-R 15 W wireless power receiver
  - Cirrus Logic CS40L25 haptic driver
  - Cirrus Logic CS35L36CWZ audio amplifier
  - Qualcomm PM8150S power management IC
  - Samsung S2MPG01 wireless charging chip (likely)
  - Dialog Semiconductor mixed signal array

	   ● Chip ID, director's cut part 2: ● Qualcomm SDR8150 RF transceiver ● Skyworks SKY78215-11 front end module ● Skyworks SKY77365-11 quad-band GSM/GPRS/EDGE power amplifier module ● Skyworks SKY13726-11 LMB/MB/HB/UHB diversity receive module ● Skyworks SKY13727-11 MB/HB/UHB MIMO diversity receive module ● Skyworks SKY53735-11 LB/LMB/MB/HB diversity receive module See https://www.ifixit.com/Teardown/Google+Pixel+4+XL+Teardown/127320.
[20c] a computer readable medium in communication with said processor circuit and encoded with codes for directing said processor circuit to:	The Google-Hangouts Calling System includes a computer readable medium in communication with said processor circuit and encoded with codes for directing said processor circuit. In the Google- Hangouts Calling System, for example, the caller's mobile telephone includes a computer readable medium in communication with the processor circuit and encoded with codes for directing the processor circuit. For example, the caller's mobile

	telephone includes random access memory (RAM) and storage memory to hold operating system (OS) and application data. The computer readable medium includes 6 GB of Micron or Samsung K4U4E3S4AF-HGCJ LPDDR4X RAM. The computer readable medium also includes the SK hynix H28U72301CMR 64 GB Universal Flash Storage.   ● We have to dispose of quite a few brackets and shields on our way to the motherboard, but it's all worth it for these chips: ● 6 GB of Micron LPDDR4X RAM layered over the Qualcomm Snapdragon 855 ● SK hynix H28U72301CMR 64 GB Universal Flash Storage ● Samsung K4U4E3S4AF-HGCJ mystery RAM, with a big "P" on it—best guess, this is dedicated RAM for the new Pixel Neural Core chip, likely hiding directly underneath ● Pixel H1C2M3 Titan M security chip ● Knowles 8508A quad-core audio processor, no doubt to help with the new live caption and transcription features. ● Murata SS9709025 ● Avago AFEM-9106 (likely a front-end module) See

	https://www.ifixit.com/Teardown/Google+Pixel+4+XL+Teardown/127320.
[20d] receive, from a user of the mobile telephone, a callee identifier associated with the callee;	The Google-Hangouts Calling System receives, from a user of the mobile telephone, a callee identifier associated with the callee. In the Google-Hangouts Calling System, for example, the caller's mobile telephone uses the Hangouts software application to exchange messages and make Hangouts calls. Composing a message or initiating a Hangouts call using message the Hangouts software application begins with a user entering of a callee identifier associated with a callee into the caller's mobile telephone. The user input, which may comprise a partial name, a partial email address, or a partial telephone number, is input into the contact list search box, on a touch screen displaying contacts to obtain the callee identifier, and/or via voice command and which comprises one or more email addresses and/or telephone numbers associated with the callee. The caller's mobile telephone uses the Hangouts software application to obtain the email addresses and/or telephone numbers associated with the callee from the user input associated with the caller's mobile telephone.
[20e-1] cause an access code request message to be transmitted to an access server	The Google-Hangouts Calling System transmits an access code request message to an access server to seek an access code from a pool of access codes. In the Google-Hangouts Calling System, for example, receiving the email addresses and/or the telephone numbers associated with the callee causes the caller's mobile telephone to

	use the Hangouts software application to transmit an access code request message to an access server. In the Google-Hangouts Calling System, for example, the caller's mobile telephone uses the Hangouts software application to transmit an access code request message to an access server. In response to receiving the email addresses and/or the telephone numbers associated with the callee, the caller's mobile telephone uses the Hangouts software application to transmit an access code request message comprising one or more parts or portions. The caller's mobile telephone communicates the parts or portions associated with the access code request message to an access server comprising one or more servers associated with the Google-Hangouts server infrastructure. • In one or more communications, the caller's mobile telephone uses the Hangouts software application to communicate one or more packets with one or more access servers, such as one or more of the Hangouts DNS servers associated with the Google-Hangouts server infrastructure. The packets communicated with the Hangouts DNS servers comprise one or more of the parts or portions associated with the access code request message. The packets, for example, comprise information asking the Hangouts DNS servers to identify one or more access servers to use to exchange a message or setup and initiate a Hangouts call. Specifically, the packets comprise one or more DNS queries that query the Hangouts DNS servers for one or more IP addresses associated with one or more of the Hangouts Calling servers. The caller's mobile telephone uses the Hangouts

	software application to communicate at least one DNS query asking the Hangouts DNS servers for the IP addresses associated with the Hangouts Calling servers. One or more domain names are used by the Hangouts software application to communicate with the Hangouts DNS servers to obtain the IP addresses associated with the Hangouts Calling servers. • In one or more communications, the caller's mobile telephone uses the Hangouts software application to communicate one or more packets with one or more access servers, such as one or more of the Hangouts Calling servers associated with the Google-Hangouts server infrastructure. The packets communicated with the Hangouts Calling servers comprise one or more of the parts or portions forming the access code request message. The packets, for example, comprise information asking the Hangouts Calling servers how to exchange a message or setup and initiate a Hangouts call with one or more access servers. Specifically, the packets comprise information asking the Hangouts Calling servers to select and connect to a calling gateway, establish signaling using HTTPS, establish a media port and provide connectivity negotiation using ICE/STUN/TURN, and provide conference or PSTN calling audio using SRTP via the calling gateway. See https://support.google.com/a/answer/1279090?hl=en. The caller's mobile telephone uses the Hangouts software application to communicate with Hangouts Calling servers associated with the IP addresses identified by the Hangouts DNS servers, to select and connect to a calling gateway, establish signaling using HTTPS, establish a media port and provide connectivity negotiation using

	ICE/STUN/TURN, and provide conference or PSTN calling audio using SRTP via the calling gateway.
[20e-2] to seek an access code from a pool of access codes wherein each access code in said pool of access codes identifies a respective telephone number or Internet Protocol (IP) network address that enables a local call to be made to call the callee identified by the callee identifier	The Google-Hangouts Calling System transmits an access code request message to seek an access code from a pool of access codes and includes a pool of access codes wherein each access code in said pool of access codes identifies a respective telephone number or Internet Protocol (IP) network address that enables a local call to be made to call the callee identified by the callee identifier. In the Google-Hangouts Calling System, for example, the caller's mobile telephone uses the Hangouts software application to transmit an access code request message comprising one or more parts or portions. The caller's mobile telephone communicates the parts or portions associated with the access code request message with the Google-Hangouts server infrastructure, including the email address or telephone number associated with the caller discussed with respect element [20d]. The email address or telephone number identified in element [20d] is an example of the callee identifier. • In one or more communications, the caller's mobile telephone uses the Hangouts software application to communicate an email address or telephone number with the Hangouts Calling servers. Specifically, the caller's mobile telephone uses the Hangouts software application to communicate an email address or telephone number with the Hangouts Calling servers to select and connect to a calling gateway, establish signaling using HTTPS, establish a media port and provide

	connectivity negotiation using ICE/STUN/TURN, and provide conference or PSTN calling audio using SRTP via the calling gateway.
[20e-3] said access code request message including said callee identifier and	The Google-Hangouts Calling System includes the callee identifier in the access code request message. In the Google-Hangouts Calling System, for example, the caller's mobile telephone uses the Hangouts software application to transmit an access code request message comprising one or more parts or portions. The caller's mobile telephone communicates the parts or portions associated with the access code request message with the Google-Hangouts server infrastructure, including the email address or telephone number associated with the caller discussed with respect element [1a]. The email address or telephone number identified in element [1a] is an example of the callee identifier. • In one or more communications, the caller's mobile telephone uses the Hangouts software application to communicate an email address or telephone number with the Hangouts Calling servers. Specifically, the caller's mobile telephone uses the Hangouts software application to communicate an email address or telephone number with the Hangouts Calling servers to select and connect to a calling gateway, establish signaling using HTTPS, establish a media port and provide connectivity negotiation using ICE/STUN/TURN, and provide conference or PSTN calling audio using SRTP via the calling gateway.

[20e-4] a location identifier separate and distinctive from said callee identifier	The Google-Hangouts Calling System includes a location identifier separate and distinctive from the callee identifier in the access code request message. In the Google-Hangouts Calling System, for example, the caller's mobile telephone uses the Hangouts software application to transmit an access code request message comprising one or more parts or portions. The caller's mobile telephone communicates the parts or portions associated with the access code request message with the Google-Hangouts server infrastructure, including an IP address associated with the caller's mobile telephone. The IP address associated with the caller's mobile telephone is an example of the location identifier and is separate and distinctive from the callee identifier as set forth in element [20e-3]. • In one or more communications, the caller's mobile telephone uses the Hangouts software application to communicate an IP address associated with the caller's mobile telephone with the Hangouts DNS servers to obtain one or more IP addresses associated with one or more Hangouts Calling servers. • In one or one or more communications, the caller's mobile telephone uses the Hangouts software application to communicate an IP address associated with the caller's mobile telephone with the Hangouts Calling servers for the information asking the Hangouts Calling servers how to exchange a message or setup and initiate a Hangouts call.

[20e-5] said location identifier identifying a location of the mobile telephone;	The Google-Hangouts Calling System includes a location identifier identifying a location of the mobile telephone in the access code request message. In the Google-Hangouts Calling System, for example, the caller's mobile telephone uses the Hangouts software application to transmit an access code request message comprising one or more parts or portions. The caller's mobile telephone communicates the parts or portions associated with the access code request message with the one or more communications, including an IP address associated with the caller's mobile telephone. The IP address associated with the caller's mobile telephone identifies a location associated with the caller's mobile telephone, such as one or more of the following locations: • an actual geographic location associated with the caller's mobile telephone, which is identified by an IP address assigned to the caller's mobile telephone by a service provider, such as a wireless carrier or Internet Service Provider (ISP); • an actual geographic location associated with the caller's mobile telephone, which is identified by an IP address assigned to a router by a service provider, such as a wireless carrier or ISP, and through which the caller's mobile telephone directly or indirectly communicates with the Google-Hangouts server infrastructure; • an actual geographic location associated with the caller's mobile telephone, which is identified by an IP address assigned to a proxy server by a service provider independent of the Google-Hangouts server infrastructure, such as a wireless carrier or ISP, and which is physically located at an office/data center owned or

	leased by the service provider or a customer of the service provider and through which the caller's mobile telephone directly or indirectly communicates with the Google-Hangouts server infrastructure; • a relative geographic location associated with the caller's mobile telephone, which is identified using a location physically or logically relative to the Google-Hangouts server infrastructure by an IP address assigned by a service provider independent of the Google-Hangouts server infrastructure to the caller's mobile telephone, a router through which the caller's mobile telephone communicates with the Google-Hangouts server infrastructure, or a proxy server through which the caller's mobile telephone communicates with the Google-Hangouts server infrastructure; • a proximate location associated with the caller's mobile telephone, which is identified using a location physically or logically approximate to the Google-Hangouts server infrastructure by an IP address assigned by a service provider independent of the Google-Hangouts server infrastructure to the caller's mobile telephone, a router through which the caller's mobile telephone communicates with the Google-Hangouts server infrastructure, or a proxy server through which the caller's mobile telephone communicates with the Google-Hangouts server infrastructure.
[20f-1] receive an access code reply message from the access server in	The Google-Hangouts Calling System receives an access code reply message from the access server in response to said access code request message.

response to said access code request message,	In the Google-Hangouts Calling System, for example, the caller's mobile telephone uses the Hangouts software application to receive an access code reply message from the access server in response to the access code request message. The caller's mobile telephone uses the Hangouts software application to receive the access code reply message comprising one or more parts or portions. The caller's mobile telephone obtains the parts or portions associated with the access code reply message from an access server comprising one or more servers associated with the Google-Hangouts server infrastructure. • In one or more communications, the caller's mobile telephone uses the Hangouts software application to obtain one or more packets from one or more access servers, such as one or more of the Hangouts DNS servers associated with the Google-Hangouts server infrastructure. The packets communicated from the Hangouts DNS servers comprise one or more parts or portions associated with the access code reply message. The packets, for example, comprise information identifying one or more access servers to use to exchange a message or setup and initiate a Hangouts call. Specifically, the packets comprise one or more DNS replies that answer at least one query from the caller's mobile telephone for one or more IP addresses associated with one or more of the Hangouts Calling servers. The packets include at least one DNS reply communicated from the Hangouts DNS servers. • In one or more communications, the caller's mobile telephone uses the Hangouts software application to obtain one or more packets from one or more access

	servers, such as one or more of the Hangouts Calling servers associated with the Google-Hangouts server infrastructure. The packets communicated from the Hangouts Calling servers comprise one or more parts or portions associated with the access code reply message. The packets, for example, comprise information from the Hangouts Calling servers on how to select a calling gateway, exchange a message, or setup and initiate a Hangouts call with one or more access servers. Specifically, the packets comprise information asking the Hangouts Calling servers to select and connect to a calling gateway, establish signaling using HTTPS, establish a media port and provide connectivity negotiation using ICE/STUN/TURN, and provide conference or PSTN calling audio using SRTP via the calling gateway. See https://support.google.com/a/answer/1279090?hl=en. The caller's mobile telephone uses the Hangouts software application to obtain, from the Hangouts Calling servers associated with the IP addresses identified by the Hangouts DNS servers, the information on how to select and connect to a calling gateway, establish signaling using HTTPS, establish a media port and provide connectivity negotiation using ICE/STUN/TURN, and provide conference or PSTN calling audio using SRTP via the calling gateway.
[20f-2] said access code reply message including an access code different from said callee identifier and	The Google-Hangouts Calling System receives said access code reply message including an access code different from said callee identifier.

	In the Google-Hangouts Calling System, for example, the caller's mobile telephone uses the Hangouts software application to receive the access code reply message comprising one or more parts or portions. The caller's mobile telephone communicates with the Google-Hangouts server infrastructure to obtain the parts or portions associated with the access code request message, including an access code different from the callee identifier as set forth in element [20e-3]. In the Google-Hangouts Calling System, for example: • In one or more communications with the Hangouts DNS servers, the caller's mobile telephone obtains all or part of the access code, comprising the IP addresses associated with the Hangouts Calling servers. The Hangouts DNS servers resolve the DNS queries for IP addresses associated with the Google-Hangouts server infrastructure. The access code comprising the IP addresses associated with the Google-Hangouts server infrastructure is different from the callee identifier as set forth in element [20e-3]. • In one or more communications with the Hangouts Calling servers, the caller's mobile telephone obtains all or part of the access code, comprising the information from the Hangouts Calling servers on how to exchange a message or setup and initiate a Hangouts call. The access code comprising the information from the Hangouts Calling servers on how to exchange a message or setup and initiate a Hangouts call is different from the callee identifier as set forth in element [20e-3].

[20f-3] associated with said location identifier and/or associated with a location pre-associated with the mobile telephone	The Google-Hangouts Calling System receives said access code reply message including an access code associated with said location identifier and/or associated with a location pre-associated with the mobile telephone. In the Google-Hangouts Calling System, for example, the caller's mobile telephone uses the Hangouts software application to receive the access code reply message comprising one or more parts or portions. The caller's mobile telephone communicates with the Google-Hangouts server infrastructure to obtain the parts or portions associated with the access code request message, including an access code associated with the location identifier and/or associated with a location pre-associated with the caller's mobile telephone. In the Google-Hangouts Calling System, for example: • In one or more communications with the Hangouts DNS servers, the caller's mobile telephone obtains all or part of the access code, comprising the IP addresses associated with the Hangouts Calling servers. The access code, comprising the IP addresses associated with the Hangouts Calling servers, is associated with the location identifier and/or associated with a location pre-associated with the mobile telephone. The caller's mobile telephone communicates with the Hangouts DNS servers using an IP address associated with the caller's mobile telephone, which comprises the location identifier as discussed with respect to element [1b-5]. The Hangouts DNS servers use the IP address associated with the caller's mobile

	telephone to resolve the DNS queries for IP addresses associated with the Google-Hangouts server infrastructure. The Hangouts DNS servers resolve the DNS queries within the block of IP addresses assigned to Hangouts. See https://support.google.com/a/answer/1279090?hl=en. The Hangouts DNS servers use the IP address associated with the caller's mobile telephone as the location identifier to return IP addresses within the block assigned to Hangouts for geographically situated servers associated with the Google-Hangouts server infrastructure. • In one or more communications with the Hangouts Calling servers, the caller's mobile telephone obtains all or part of the access code, comprising the information from the Hangouts Calling servers on how to exchange a message or setup and initiate a Hangouts call. The access code, comprising the information from the Hangouts Calling servers on how to exchange a message or setup and initiate a Hangouts call, is associated with the location identifier and/or associated with a location pre-associated with the mobile telephone. The caller's mobile telephone uses the Hangouts software application to communicate with the Hangouts Calling servers using an IP address associated with the caller's mobile telephone, which comprises the location identifier as discussed with respect to element [1b-5]. The Hangouts Calling servers use the IP address associated with the caller's mobile telephone to establish the shared secret and derive the session keys for the media channels. The Hangouts Calling servers use the IP address associated with the caller's mobile telephone as the location identifier to select and connect to a calling

	gateway, establish signaling using HTTPS, establish a media port and provide connectivity negotiation using ICE/STUN/TURN, and provide conference or PSTN calling audio using SRTP via the calling gateway for geographically situated servers associated with the Google-Hangouts server infrastructure.
[20f-4] wherein said access code expires after a period of time; and	The Google-Hangouts Calling System receives said access code reply message including an access code, wherein said access code expires after a period of time. In the Google-Hangouts Calling System, for example, the caller's mobile telephone uses the Hangouts software application to receive the access code reply message comprising one or more parts or portions. The caller's mobile telephone communicates with the Google-Hangouts server infrastructure to obtain the parts or portions associated with the access code request message, including an access code that expires after a period of time. • In one or more communications, the caller's mobile telephone obtains all or part of the access code, comprising the IP addresses associated with the Hangouts Calling servers. The access code, comprising the IP addresses associated with the Hangouts Calling servers, expires after a period of time. The Hangouts DNS servers assign time-to-live TTL values in the DNS reply messages resolving the IP addresses for the Google-Hangouts server infrastructure. The TTL values indicate that validity of the responses resolving the IP addresses expires after a period of time. • In one or more communications, the caller's mobile telephone obtains all or part of the access code, comprising the information from the Hangouts Calling servers on how to exchange a message or setup and initiate a Hangouts call. The access code,

	comprising the information from the Hangouts Calling servers on how to exchange a message or setup and initiate a Hangouts call, expires after a period of time. The information from the Hangouts Calling servers on how to exchange a message or setup and initiate a Hangouts call includes connect to a calling gateway, establish signaling using HTTPS, establish a media port and provide connectivity negotiation using ICE/STUN/TURN, and provide conference or PSTN calling audio using SRTP via the calling gateway. See https://support.google.com/a/answer/1279090?hl=en.
[20g] initiate a call using said access code to identify the callee.	The Google-Hangouts Calling System initiates a call with the mobile telephone using the access code to identify the callee. In the Google-Hangouts Calling System, for example, the caller's mobile telephone uses the Hangouts software application to initiate a call using the access code to identify the callee. • The caller's mobile telephone uses the Hangouts software application to initiate the Hangouts call using the IP addresses obtained from the Hangouts DNS servers that identify the Hangouts Calling servers through which a call to the callee can be initiated. • The caller's mobile telephone uses the Hangouts software application to initiate the Hangouts call using the information from the Hangouts Calling servers on how to exchange a message or setup and initiate a Hangouts call. The caller's mobile

	telephone uses the Hangouts software application to select and connect to a calling gateway, establish signaling using HTTPS, establish a media port and provide connectivity negotiation using ICE/STUN/TURN, and provide conference or PSTN calling audio using SRTP via the calling gateway. See https://support.google.com/a/answer/1279090?hl=en. The Google-Hangouts Calling System enables mobile telephone roaming. The Google-Hangouts Calling System produces an access code identifying a communication channel useable by the mobile telephone to initiate a call to a callee using the channel. In the Google-Hangouts Calling System, the access code is based on a location identifier and/or based on a location pre-associated with the mobile telephone. The access code identifies a communication channel on a gateway through which the caller's mobile telephone may initiate a Hangouts call. In the Google-Hangouts Calling System, communication channels provided by the Hangouts Calling servers are used for Hangouts calls between mobile telephones. The communications channels also can connect the caller's mobile telephone with other devices using telephone lines in a Public Switched Telephone Network (PSTN). The Hangouts Calling servers can direct calls that are received on the communications channels to a gateway leading to the PSTN. The Hangouts Calling servers use the communications channels to cooperate with an IP network and the gateway to the PSTN to cause a call involving the caller's mobile telephone to be routed through the IP network and continue to the PSTN. The communication channels provided by the Hangouts Calling servers provide the benefit of a local calling area associated with the caller's mobile telephone, both over the IP network and the PSTN. The expression "local calling area"

	herein refers generally to where calls may be placed by callers within the local calling area at either no additional charge or at a lower additional charge than would be required for calls to numbers that are outside of the local calling area.